Amendments to the Claims:

This listing of claims will replace all prior version, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A stage device comprising:

a stage controllable in at least one degree of freedom;

a supporting stage; and

at least one pair of electromagnetic actuator devices that couple said stage to said supporting stage for control in at least one of said degrees of freedom, each electromagnetic actuator device comprising an actuating portion and a relative moving portion that is movable relative to said actuating portion, the actuating portion or the relative moving portion of said pair of electromagnetic actuator devices being mounted adjacent a single side of said stage in association with a direction of force produced by said pair of electromagnetic actuator devices,

wherein each of the at least one pair of electromagnetic actuator devices is configured to vary a gap between portions of each of the at least one pair of electromagnetic actuator devices.

2. (Original) The stage device of claim 1, wherein said actuating portion of said electromagnetic actuator device is mounted on said supporting stage, and said relative moving portion of said electromagnetic actuator device is mounted to said stage adjacent to said actuating portion within a predetermined gap defined by said electromagnetic actuator device.

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3. (Original) The stage device of claim 1, wherein one relative moving portion is used as both of said relative moving portions of said pair of electromagnetic actuator devices.

4. (Original) The stage device of claim 2, wherein both of said actuating portions of said pair of electromagnetic actuator devices are mounted on said supporting stage, and a pair of corresponding relative moving portions are mounted on said stage adjacent one another and within a predetermined gap defined by said electromagnetic actuator devices.

5. (Original) The stage device of claim 4, wherein said pair of corresponding relative moving portions are peripherally mounted on said stage.

6. (Original) The stage device of claim 5, further comprising at least one mount member that extends from said stage, wherein said pair of corresponding relative moving portions are mounted on said mount member such that a resultant force from actuation of said pair of electromagnetic actuator devices is transferred to said stage through said mount member.

7. (Original) The stage device of claim 1, wherein said stage is positionally controllable in at least three degrees of freedom, said at least one pair of

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electromagnetic actuator devices comprising at least three pairs of electromagnetic actuator devices.

8. (Original) The stage device of claim 7, wherein two of said at least three pairs of electromagnetic actuator devices are aligned substantially parallel to a first direction, and a third of said at least three pairs of electromagnetic actuator devices is aligned in a second direction substantially perpendicular to said first direction.

9. (Original) The stage of claim 8, wherein said first and said second directions are within a plane in which a main surface of said stage substantially lies.

10. (Original) The stage device of claim 8, wherein said first direction is substantially parallel to a moving direction of said supporting stage.

11. (Original) The stage device of claim 1, wherein said electromagnetic actuator device comprises a variable reluctance actuator.

12. (Original) The stage device of claim 1, wherein said at least one pair of electromagnetic actuator devices comprises three pairs of electromagnetic actuator devices that interconnect said stage and said supporting stage and are actuable to control said stage in three degrees of freedom.

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13. (Original) The stage device of claim 12, further comprising at least one additional electromagnetic actuator device mounted between said stage and said supporting stage and actuable to control said stage in at least one additional degree of freedom.

14. (Original) The stage device of claim 13, further comprising at least one supplemental vertical support mounted between said stage and said supporting stage, and disposed at the substantially same location relative to the stage as said additional electromagnetic actuator device.

15. (Original) The stage device of claim 13, further comprising:

a plurality of supplemental vertical supports, for each of said additional electromagnetic actuator devices, mounted between said stage and said supporting stage, and disposed at the substantially same location relative to the stage as said additional electromagnetic actuator device; and

a suspending member that is supported by said plurality of supplemental vertical supports and flexibly supports the stage.

16. (Original) The stage device of claim 15, wherein said additional electromagnetic actuator device comprises at least one additional pair of electromagnetic actuator devices disposed adjacent each other, each electromagnetic actuator device comprising an actuating portion and a relative moving portion that is movable relative to said actuating portion in a vertical direction, and one of said

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actuating portion and said relative moving portion is mounted on said stage and the other of said actuating portion and said relative moving portion is mounted on said supporting stage.

17. (Original) The stage device of claim 16, farther comprising a flexible member that connects the suspending member and at least one of the relative moving portions of said additional pair of electromagnetic actuator devices.

18. (Original) The method of claim 17, wherein the flexible member connects the suspending member and the at least one of the relative moving portions of said additional pair of electromagnetic actuator devices through a hole formed vertically within the actuating portion positioned above said at least one of the relative moving portions of said additional pair of electromagnetic actuator devices.

19. (Original) The stage device of claim 16, wherein one relative moving portion of said additional pair of electromagnetic actuator devices is used as both of said relative moving portions of said additional pair of electromagnetic actuator devices, said two actuating portions of said additional pair of electromagnetic actuator devices are vertically aligned with said one relative moving portion interposed between the two actuating portions.

20. (Original) The stage device of claim 12, wherein said electromagnetic actuator device comprises a variable reluctance actuator.

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21. (Original) The stage device of claim 13, wherein said electromagnetic actuator devices and said additional electromagnetic actuator device comprise a variable reluctance actuator.

22. (Original) The stage device of claim 13, wherein said additional electromagnetic actuator device comprises a voice coil motor.

23. (Original) The stage device of claim 13, wherein said at least one additional electromagnetic actuator device comprises three additional electromagnetic actuator devices mounted between said stage and said supporting stage and actuable to control said stage in three degrees of freedom.

24. (Original) The stage device of claim 14, wherein said at least one additional electromagnetic actuator device comprises three additional electromagnetic actuator devices mounted between said stage and said supporting stage and actuable to control said stage in three degrees of freedom, and said at least one supplemental vertical support comprises three supplemental vertical supports, each of said three supplemental vertical supports being disposed at the substantially same location as a corresponding electromagnetic actuator device of said three additional electromagnetic actuator devices.

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25. (Original) The stage of claim 15, wherein said at least one additional electromagnetic actuator device comprises three additional electromagnetic actuator devices mounted between said stage and said supporting stage and actuable to control said stage in three degrees of freedom, said plurality of supplemental vertical supports being provided for each of said three additional electromagnetic actuator devices and being disposed at the substantially same location as a corresponding electromagnetic actuator device of said three additional electromagnetic actuator devices.

26. (Original) The stage device of claim 22, wherein said pairs of electromagnetic actuator devices comprise variable reluctance actuators and said stage further comprises supplemental vertical supports mounted between said stage and said supporting stage.

27. (Original) The stage device of claim 14 or 26, wherein at least one of said supplemental vertical supports comprises air bellows.

28. (Original) The stage device of claim 1, further comprising at least one non-contact vertical support member that levitates said stage above said supporting stage.

29. (Original) The stage device of claim 28, further comprising at least one supplemental vertical support mounted between said stage and said supporting stage, and disposed at the substantially same location relative to the stage as said non-contact vertical support member.

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30. (Original) The stage device of claim 28, wherein said at least one non-contact vertical support member comprises three non-contact vertical support members that controls the position of said stage in three vertical degrees of freedom.

31. (Original) The stage device of claim 29, wherein said at least one non-contact vertical support member comprises three non-contact vertical support members that controls the position of said stage in three vertical degrees of freedom, and said at least one supplemental vertical support comprises three supplemental vertical supports, each of said three supplemental vertical supports being disposed at the substantially same location as a corresponding non-contact vertical support member of said three non-contact vertical support member.

32. (Original) The stage of claim 28, wherein each said non-contact vertical support member comprises an electromagnetic actuator device.

33. (Original) The stage device of claim 29, wherein each said non-contact vertical support member comprises an electromagnetic actuator device, and each said supplemental vertical support comprises air bellows.

34. (Original) The stage device of claim 30, wherein each said non-contact vertical support member comprises a voice coil motor having a magnet portion and a coil portion, one of said magnet portion and said coil portion being mounted on said

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stage and the other of said magnet portion and said coil portion being mounted on said supporting stage.

35. (Original) The stage device of claim 31, wherein each said non-contact vertical support member comprises a pair of electromagnetic actuator devices disposed adjacent each other, each electromagnetic actuator device comprising an actuating portion and a relative moving portion that is movable relative to said actuating portion in a vertical direction, and one of said actuating portion and said relative moving portion is mounted on said stage and the other of said actuating portion and said relative moving portion is mounted on said supporting stage.

36. (Original) The stage device of claim 28, further comprising at least one dead weight support for vertically supporting a dead weight of said stage.

37. (Original) The stage device of claim 28, further comprising at least one bellows that couples said stage and said supporting stage and vertically supports a dead weight of said stage.

38. (Original) The stage device of claim 37, wherein said at least one bellows comprises three bellows.

39. (Original) The stage device of claim 1, further comprising:

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a driving device that moves said supporting stage, and comprises a first portion connected to said supporting stage and a second portion that is movable relative to said first portion;

a base member that guides supporting stage in at least one direction; and a supporting member that supports said second portion of said driving device.

40. (Original) The stage device of claim 39, wherein said driving device moves said supporting stage in a first direction and a second direction substantially perpendicular to said first direction.

41. (Original) The stage device of claim 39, wherein the force acting on said supporting stage is connected directly to ground through said supporting member without coupling with said base member.

42. (Original) The stage device of claim 39, wherein said base is isolated from a route of a reaction force generated by actuation of said driving device.

43. (Original) The stage device of claim 39, further comprising at least one position detection device that detects a position of said stage, said position detection device being connected to a member that is not coupled with said supporting member.

44. (Currently Amended) A lithography system comprising:

an illumination system that irradiates radiant energy; and

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the stage device according to any one of claims [[l]] 1 to 26 or any one of claims 28 to 43, said stage device carrying an object disposed on a path of said radiant energy.

45. (Original) The lithography system of claim 44, further comprising an optical system and said supporting stage substantially aligned with said optical system.

46. (Original) The lithography system of claim 44, further comprising a mask stage that holds a mask having a pattern, and said mask is positioned between said illumination system and said stage

47. (Original) The lithography system of claim 45, further comprising a frame that supports at least one of said illumination system and said optical system, and is dynamically isolated from said stage device.

48. (Original) The lithography system of claim 46, wherein said optical system is positioned between said mask and said stage.

49. (Original) A device on which an image has been formed by the lithography system of claim 44.

50. (Currently Amended) A method of making a stage device comprising:

providing a stage that is controllable in at least one degree of freedom;

providing a supporting stage; [[and]]

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providing at least one pair of electromagnetic actuator devices coupling said stage to said supporting stage for control in at least one of said degrees of freedom, wherein each electromagnetic actuator device comprises an actuating portion and a relative moving portion that is movable relative to said actuating portion, both actuating portions or both relative moving portions of said pair of said electromagnetic actuator devices being mounted adjacent a single side of said stage in association with a direction of force produced by said pair of electromagnetic actuator devices, and

varying a gap between portions of each of the at least one pair of electromagnetic actuator devices.

51. (Original) A method of making a lithography system comprising:

providing an illumination system that irradiates radiant energy; and

providing a stage device made by the method of claim 50.

52. (Original) A method of making a device utilizing the lithography system made by the method of claim 51.

53. (Currently Amended) A method of positioning a stage comprising inputting opposing forces for moving the stage in opposite directions at the substantially same location on the stage, such that a pulling force for moving the stage in a first direction is inputted at the same side of the stage as a pushing force for moving the stage in a second direction opposite to the first direction by varying a gap between portions of each electromagnetic actuator devices.

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54. (Original) The method of claim 53, wherein said inputting comprises inputting magnetic driving forces with no physical contact of the stage by a driver.

55. (Original) The method of claim 53, further comprising controlling movements in at least three degrees of freedom of said stage by arranging three input locations on the stage, such that a pulling force for moving the stage in a first direction at each location is inputted at the same side of the stage as a pushing force for moving the stage in a second direction opposite to the first direction.

56. (Original) The method of claim 55, further comprising actuating said controlling movement in at least one degree of freedom with a vertical actuator.

57. (Original) The method of claim 56, wherein said controlling movement is actuated in three degrees of freedom.

58. (Original) The method of claim 56, wherein said vertical actuator comprises at least one voice coil motor.

59. (Original) The method of claim 53, further comprising floating said stage with respect to a support stage such that positioning movements of the stage are performed with no physical contact occurring between the stage and the support stage.

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60. (Original) The method of claim 59, wherein said floating comprises electromagnetically biasing the stage with respect to the support stage.

61. (Original) The method of claim 55, further comprising supporting a weight of the stage by a supplemental vertical force at the substantially same location as said vertical actuator.

62. (Original) The method of claim 61, wherein the supplemental vertical force is generated by air bellows, and the vertical actuator is a pair of electromagnetic actuator devices disposed adjacent each other, each electromagnetic actuator device comprising an actuating portion and a relative moving portion that is movable relative to said actuating portion in a vertical direction.

63. (Original) The method of claim 53, wherein said pulling force is greater than said pushing force, resulting in a net force in said first direction.

64. (Original) The method of claim 53, wherein said pushing force is greater than said pulling force, resulting in a net force in said second direction.

65. (Currently Amended) An exposure method for forming a pattern on an object utilizing an optical system, the method comprising:

mounting said object on a stage;

moving a supporting stage substantially aligned with said optical system; and

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moving said stage relative to said supporting stage by at least one pair of electromagnetic actuator devices coupling said stage to said supporting stage for control in at least one degree of freedom, both actuating portions of said pair of said electromagnetic actuator devices being mounted adjacent a single side of said stage,

wherein each electromagnetic actuator device is configured to vary a gap between portions of each electromagnetic actuator device.

66. (Original) The method of claim 65, wherein said actuating portion of said electromagnetic actuator device is mounted on said supporting stage, and a relative moving portion of said electromagnetic actuator device is mounted on said stage adjacent to said actuating portion within a predetermined gap defined by said electromagnetic actuator device.

67. (Original) The method of claim 65, wherein said stage is positionally controllable in at least three degrees of freedom, and said at least one pair of electromagnetic actuator devices comprises at least three pairs of electromagnetic actuator devices.

68. (Original) The method of claim 65, wherein said electromagnetic actuator device comprises a variable reluctance actuator.

69. (Original) The method of claim 65, wherein said at least one pair of electromagnetic actuator devices comprises three pairs of electromagnetic actuator

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devices that interconnect said stage and said supporting stage and are actuable to control said stage in three degrees of freedom.

70. (Original) The method of claim 65, further comprising levitating said stage above said supporting stage with at least one non-contact vertical support member.

71. (Original) The method of claim 70, further comprising supporting a weight of the stage by a supplemental vertical force at the substantially same location as said non-contact vertical support member.

72. (Original) The method of claim 65, further comprising:

moving said supporting stage with a drive device, said drive device comprises a first portion connected to said supporting stage and a second portion that is movable relative to said first portion, said second portion being supported by a supporting member; and

guiding said supporting stage in at least one direction with a base member.

73. (Original) A method for making a device utilizing the exposure method of any of claims 65 to 72.

74. (Currently Amended) A stage device comprising:

a stage that has a holding portion where an object can be held, said stage being controllable in at least one degree of freedom;

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a first electromagnetic actuator device connected with said stage, said first electromagnetic actuator device moves said stage in one direction; and

a second electromagnetic actuator device connected with said stage, said second electromagnetic actuator device moves said stage in an opposite direction of said one direction,

wherein said holding portion of said stage is not disposed between a first transferring portion where a first force from an actuation of said first electromagnetic actuator device is transferred to said stage and a second transferring portion where a second force from an actuation of said second electromagnetic actuator device is transferred to said stage,

wherein each of the first and second electromagnetic actuator devices is configured to vary a gap between portions of each of the first and second electromagnetic actuator devices.

75. (Original) The stage device of claim 74, wherein said first and second electromagnetic actuator device comprise variable reluctance actuators.

76. (Original) The stage device of claim 74, further comprising a stage support, and said first and second electromagnetic actuator devices couple said stage to said stage support.

77. (Original) The stage device of claim 76, wherein said first and second electromagnetic actuator device each comprising an actuating portion and a relative

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moving portion that is movable relative to said actuating portion, and one of said actuating portion and said relative moving portion is mounted on said stage and the other of said actuating portion and said relative moving portion is mounted on said stage support.

78. (Original) An exposure apparatus comprising:

an illumination system that irradiates radiant energy; and

the stage device according to any of claims 74 to 77.

79. (Original) A device on which an image has been formed by the exposure apparatus of claim 78.

80. (Currently Amended) A method of making a stage device comprising:

providing a stage that has a holding portion where an object can be held, said stage being controllable in at least one degree of freedom;

providing a first electromagnetic actuator device connected with said stage, said first electromagnetic actuator device moves said stage in one direction; [[and]]

providing a second electromagnetic actuator device connected with said stage, said second electromagnetic actuator device moves said stage in an opposite direction of said one direction, and

varying a gap between portions of each of the first and second electromagnetic actuator devices,

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wherein said holding portion of said stage is not disposed between a first transferring portion where a first force from an actuation of said first electromagnetic actuator device is transferred to said stage and a second transferring portion where a second force from an actuation of said second electromagnetic actuator device is transferred to said stage.

81. (Original) A method of making an exposure apparatus comprising:

providing an illumination system that irradiates radiant energy; and

providing a stage device made by the method of claim 80.

82. (Original) A method of making a device utilizing the exposure apparatus made by method of claim 81.

83. (Currently Amended) A method for driving a stage that has a holding portion where an object can be held, said stage being controllable in at least one degree of freedom, comprising:

moving said stage in one direction by transferring a first force from an actuation of a first electromagnetic actuator device; and

moving said stage in an opposite direction of said one direction by transferring a second force from an actuation of a second electromagnetic actuator device,

wherein said holding portion of said stage is not disposed between a first transferring portion where said first force is transferred to said stage and a second transferring portion where said second force is transferred to said stage.

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wherein each of the first and second electromagnetic actuator devices is configured to vary a gap between portions of each of the first and second electromagnetic actuator devices.

84. (Original) An exposure method for forming a pattern on an object utilizing the method for driving a stage of claim 83.

85. (Original) An method for making a device utilizing the exposure method of claim 84.

86. (Currently Amended) A stage device comprising:

a stage controllable in a vertical direction;

a supporting stage;

at least one electromagnetic actuator device mounted between said stage and said supporting stage for control in the vertical direction; and

at least one supplemental vertical support mounted between said stage and said supporting stage, and disposed at the substantially same location relative to the stage as said electromagnetic actuator device,

wherein the at least one electromagnetic actuator device is configured to vary a gap between portions of the at least one electromagnetic actuator device.

87. (Original) The stage device of claim 86, wherein said at least one electromagnetic actuator device comprises at least one pair of electromagnetic actuator

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devices disposed adjacent each other, each electromagnetic actuator device comprising an actuating portion and a relative moving portion that is movable relative to said actuating portion in the vertical direction, and one of said actuating portion and said relative moving portion is mounted on said stage and the other of said actuating portion and said relative moving portion is mounted on said supporting stage.

88. (Original) The stage device of claim 87, wherein both of said actuating portions of said pair of electromagnetic actuator devices are mounted on said supporting stage, and both of said relative moving portions are mounted on said stage and within a predetermined gap defined by said electromagnetic actuator devices.

89. (Original) The stage device of claim 87, wherein one relative moving portion is used as both of said relative moving portions of said pair of electromagnetic actuator devices.

90. (Original) The stage device of claim 87, wherein said electromagnetic actuator device comprises a variable reluctance actuator.

91. (Original) The stage device of claim 86, wherein at least one of said supplemental vertical supports comprises air bellows.

92. (Original) The stage device of claim 86, wherein said stage is positionally controllable in three vertical degrees of freedom, said at least one electromagnetic

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actuator device comprising at least three electromagnetic actuator devices and said at least one supplemental vertical support comprising at least three supplemental vertical supports, each of said at least three supplemental vertical supports being disposed at the substantially same location relative to the stage as a corresponding electromagnetic actuator device of said at least three electromagnetic actuator devices.

93. (Currently Amended) A stage device comprising:

a stage controllable in a vertical direction;

a supporting stage;

at least one electromagnetic actuator device mounted between said stage and said supporting stage for control in the vertical direction;

a plurality of supplemental vertical supports, for each of said electromagnetic actuator devices, mounted between said stage and said supporting stage, and disposed at the substantially same location relative to the stage as said each of the electromagnetic devices; and

a suspending member that is supported by said plurality of supplemental vertical supports and flexibly suspends the stage,

wherein the at least one electromagnetic actuator device is configured to vary a gap between portions of the at least one electromagnetic actuator device.

94. (Original) The stage device of claim 93, wherein said at least one electromagnetic actuator device comprises at least one pair of electromagnetic actuator devices disposed adjacent each other, each electromagnetic actuator device comprising

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an actuating portion and a relative moving portion that is movable relative to said actuating portion in the vertical direction, and both of said actuating portions of said pair of electromagnetic actuator devices are mounted on said supporting stage, and both of said relative moving portions are mounted on said stage and within a predetermined gap defined by said electromagnetic actuator devices.

95. (Original) The stage device of claim 94, further comprises a flexible member that connects the suspending member and at least one of the relative moving portions of said pair of electromagnetic actuator devices.

96. (Original) The stage device of claim 95, wherein the flexible member connects the suspending member and the at least one of the relative moving portions of said pair of electromagnetic actuator devices through a hole formed vertically within the actuating portion positioned above said at least one of the relative moving portions.

97. (Original) The stage device of claim 95, wherein the flexible member is a wire or a thin flexible rod.

98. (Original) The stage device of claim 95, wherein one relative moving portion is used as both of said relative moving portions of said pair of electromagnetic actuator devices, said two actuating portions are vertically aligned with said one relative moving portion interposed between the two actuating portions.

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99. (Original) The stage device of claim 93, wherein said electromagnetic actuator device comprises a variable reluctance actuator.

100. (Original) The stage device of claim 93, wherein at least one of said supplemental vertical supports comprises air bellows.

101. (Original) The stage device of claim 93, wherein said stage is positionally controllable in three vertical degrees of freedom, said at least one electromagnetic actuator device comprising at least three electromagnetic actuator devices, said plurality of supplemental vertical supports being provided for each of said at least three electromagnetic actuator devices and being disposed at the substantially same location relative to the stage as a corresponding electromagnetic actuator device of said at least three electromagnetic actuator devices.

102. (Currently Amended) A method of positioning a stage comprising:

floating the stage for control in a vertical direction with no physical contact to the stage using an electromagnetic force generated at a location underneath the stage by varying a gap between portions of an electromagnetic actuator device; and

supporting a weight of the stage by a supplemental vertical force at the substantially same location as the electromagnetic force.

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103. (Original) The method of positioning a stage of claim 102, wherein the electromagnetic force is a sum of two forces in opposite directions generated by a pair

of electromagnetic actuator devices disposed adjacent each other at the location underneath the stage.

104. (Original) The method of positioning a stage of claim 102, wherein the electromagnetic force is generated by a variable reluctance actuator.

105. (Original) The method of positioning a stage of claim 102, wherein the supplemental vertical force is generated by air bellows.

106. (Original) The method of positioning a stage of claim 102, further comprising controlling movements of the stage in three vertical degrees of freedom, by applying at least three electromagnetic forces at at least three locations underneath the stage and corresponding supplemental vertical forces for each of the electromagnetic forces.

107. (Currently Amended) A method of positioning a stage comprising:

floating the stage for control in a vertical direction with no physical contact to the stage using an electromagnetic force generated at a location underneath the stage by varying a gap between portions of the electromagnetic actuator device;

supporting a suspending member using a supplemental vertical force generated at the substantially same location as the electromagnetic force; and

suspending the stage flexibly from the suspending member.

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108. (Original) The method of positioning a stage of claim 107, wherein the electromagnetic force is a sum of two forces in opposite directions generated by a pair of electromagnetic actuator devices disposed adjacent each other at the location underneath the stage

109. (Original) The method of positioning a stage of claim 108, further comprising suspending the stage using a flexible member that connects the suspending member and a relative moving portion of the electromagnetic actuator device mounted on the stage, said flexible member extending through a hole formed vertically within an actuating portion of the electromagnetic actuator device positioned above the relative moving portion.

110. (Original) The method of positioning a stage of claim 109, wherein the flexible member is a wire or a thin flexible rod.

111. (Original) The method of positioning a stage of claim 107, wherein the electromagnetic force is generated by a variable reluctance actuator.

112. (Original) The method of positioning a stage of claim 107, wherein the supplemental vertical force is generated by air bellows.

113. (Original) The method of positioning a stage of claim 107, further comprising controlling movements of the stage in three vertical degrees of freedom, by applying at

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least three electromagnetic forces at at least three locations underneath the stage and by suspending the stage from corresponding suspending members for each of the electromagnetic forces.

114. (Original) An exposure apparatus comprising:

an illumination system that irradiates radiant energy; and

the stage device according to any of claims 86 to 101.

115. (Original) An exposure method for forming a pattern on an object utilizing the method of positioning a stage according to any claims 102 to 113.

116. (Currently Amended) A stage device comprising:

a stage controllable in a vertical direction;

an electromagnetic target rigidly connected to the stage;

an electromagnet electromagnetically coupling with the stage for control in the vertical direction without physical contact to the electromagnetic target by varying a gap between the electromagnet and the electromagnetic target; and

a supplemental vertical support for supporting a weight of the stage,

wherein a force generated by the supplemental vertical support acts on the electromagnetic target for supporting the weight of the stage.

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